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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,783	12/08/2003	Kia Silverbrook	MTB09US	1040

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SILVERBROOK RESEARCH PTY LTD
393 DARLING STREET
BALMAIN, 2041
AUSTRALIA

EXAMINER	
HSIEH, SHIH WEN	
ART UNIT	**PAPER NUMBER**
2861	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/728,783	SILVERBROOK, KIA	
	Examiner	Art Unit	
	shih-wen hsieh	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) *17-24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16 and 25-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Amendment

Election/Restrictions

1. Applicant's election without traverse of Group I (claims 1-16 and 25-32) in the reply filed on Jan. 12, 2006 is acknowledged..

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-16 and 25-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Usui et al. (US pat. No. 5,790,155).

In regard to:

Claim 1:

Usui et al. teach in their fig. 1:

An inkier printhead comprising: a plurality of nozzles (4 and 5), a plurality of liquid passages (constituted by through holes 13, 20 for nozzle 4 and 14, 21 for nozzle 5) leading to each nozzle respectively for providing ejectable liquid to the associated

nozzle; droplet ejection actuators (7 and 8) and associated drive circuitry (9 and 10) corresponding to each nozzle respectively, the nozzles, ejection actuators, associated drive circuitry and liquid passage being formed on and through a monolithic wafer (27) using lithographically masked etching techniques; wherein, the monolithic wafer has a droplet ejection side (the nozzle side) and a liquid supply side (22 and 23, the ink supply port side); such that, each of the liquid passages is formed by ion etching a hole partially through the monolithic wafer from the droplet ejection side, and etching a passage from the liquid supply side of the monolithic wafer to the hole; wherein, the width of the supply passage exceeds the width of the hole by an amount that will ensure that a fluid connection is established with the hole, having regard to the tolerances of the etching process, refer to col. 3, line 55 to col. 4, line 28. The width of the supply passage exceeds the width of the hole can be seen from fig. 1.

The device of Usui et al. DIFFERS from claim 1 in that it does not teach the above underlined portion:

each of the liquid passages is formed by ino etching a hole partially through the monolithic wafer from the droplet ejection side, and ion etching a passage from the liquid supply side of the monolithic wafer to the hole.

Etching or laser ablating are the methods that are generally used in producing features such as liquid flow channels, pressure generating chambers, nozzles, etc. in ink jet printer technology, please refer to MPEP 2144.03, In re Malcolm. 129 F.2d 529, 54 USPQ 235 (CCPA 1942).

Therefore, it would have been an obvious matter that in order to form all of the necessary features such as flow channels, nozzles, etc. of a fluid ejection head, the commonly used etching method can be used to form the plurality liquid passages and the plurality of nozzles.

Claim 2:

The device of Usui et al. DIFFERS from claim 2 in that it does not teach:

wherein the width of the hole is between 8 microns and 24 microns.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to design a range for the width of the hole, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, refer to MPEP 2144.05 II A.

Claim 3:

An inkjet printhead according to claim 1 wherein the width of the supply passage is between 10 microns and 28 microns.

Rejection:

This claim is related to the range of the supply passage, and is rejected on the basis as set forth for claim 2 discussed above.

Claims 4 and 5:

The actuators used in Usui et al.'s invention are piezoelectric material. Therefore, the device of Usui et al. DIFFERS from claims 4 and 5 in that it does not teach:

An ink-jet printhead according to claim 1 wherein the droplet ejection actuators are thermal bend actuators (claim 4); and

An inkjet printhead according to claim 1 wherein the droplet ejection actuators are gas bubble generating heater elements (claim 5).

Gas bubble generating heater elements are generally use in ink jet printer as an actuator, same as piezoelectric material used for the same. Thermal bend actuator is another type of actuator, which is used in some ink jet printers to eject ink out of the nozzles in the form of an ink droplet. All of the heater element, the piezoelectric and the thermal bend actuator are well known in the art, and used commonly in ink jet printer, refer to MPEP 2144.03, In re Malcolm, 129 F.2d 529, 54 USPQ 235 (CCPA 1942).

Therefore, it would have been an obvious matter to select a type of actuator, such as a heater element, or piezoelectric or a thermal bend actuator as the actuator of the ink jet printer, since all of these actuator will have the same function of eject the ink in a form of ink droplet once a driving signal is applied to the actuator.

Claim 6:

Usui et al. further teach:

a plurality of nozzle chambers (2 and 3), each nozzle chamber corresponding to a respective nozzle (refer to fig. 1 pressure generating chamber 2 associated with nozzle 4, similarly, pressure generating chamber 3 associated with nozzle 5 (note: a nozzle chamber is where the pressure of the liquid undergone a change, which is caused by: 1. the heater element, or 2. the deformation of the nozzle chamber by the action of the piezoelectric, or 3. the activation of the thermal bend. Usui et al.'s pressure

generating chamber does the same thing. Therefore, Usui et al's pressure generating chamber corresponds to the nozzle chamber).

The device of Usui et al. DIFFERS from claim 6 in that it does not teach:

at least one the of the gas bubble generating heater elements are disposed in each of the nozzle chambers respectively;, such that, a bubble forming liquid can be supplied to the nozzle chamber for thermal contact with at least one of the bubble generating heater elements so that a bubble of the bubble forming liquid generated by one of the heater elements causes a droplet of the ejectable liquid to be ejected from the nozzle.

The above recitations are basic operation principle of an ink jet printer, and since babble generation procedure is involved, the printer is also called a "bubble ink jet printer. This type of printer uses heater element, generally in the form of resistor as the actuator. Once the resistor receives a printing signal, the electric printing signal will heat up the resistor and the ink surrounded the resistor in the nozzle chamber causing film boiling and also gone through a phase change, and the ink will be ejected out of the nozzle as an ink droplet, MPEP 2144.03, In re Malcolm, 129 F.2d 529, 54 USPQ 235 (CCPA 1942).

Claim 7:

An inkjet printhead according to claim 6 wherein the bubble forming liquid is the same as the ejected liquid.

Rejection:

This claim is rejected on the basis as set forth for claim 6 discussed above.

Claim 8:

The device of Usui et al. DIFFERs from claim 8 in that it does not teach:

wherein the printhead is a pagewidth print head.

A page width print head is generally stays stationary during a printing operation, while the print medium moves. A reciprocating print head is the head reciprocates in a so-called main scanning direction, while the print medium move in a secondary scanning direction, which is perpendicular to the main scanning direction.

Therefore, the head taught by Usui et al. could well be either type.

Claim 9:

A method of ejecting drops of an ejectable liquid from an inkjer printhead, the printhead comprising a plurality of nozzles, a plurality of liquid passages leading to each nozzle respectively, droplet ejection actuators and associated drive circuitry corresponding to each nozzle respectively, the nozzles, ejection actuators, associated drive circuitry and liquid passage being formed on and through a monolithic wafer using lithographically masked etching techniques, such that the monolithic wafer has a drop ejection side and a liquid supply side, and, each of the liquid passages is formed by ion etching a hole partially through the monolithic wafer from the drop ejection side, subsequently filling the hole with resist then ion etching a passage from the liquid supply side of the monolithic wafer to the resist before stripping the resist from the hole, wherein the width of the supply passage exceeds the width of the hole by an amount that will ensure that a fluid connection with the hole is established having regard to the tolerances of the etching process, the method of ejecting drops comprising the steps of:

providing the ejectable liquid to each of the nozzles using the associated liquid passage; and

actuating the droplet ejection actuator to eject droplets of the ejectable liquid from the nozzle.

Rejection:

Structures (i.e., subject matters, such as nozzles, liquid passages, actuators, etc.) of the claim are the same as those in claim 1 and are rejected on the basis as set forth for claim 1 discussed above.

As to the two steps, it would have been obvious that the liquid is supplied from an outside tank to the ink feed port (22 and 23, fig. 1 of Usui et al.'s reference), then the liquid flows through holes (17 and 18, fig. 1) to pressure generating chambers (2 and 3, fig. 1) to nozzles (4 and 5, fig. 1) respectively. Once printing signal is applied to the actuator, the actuator is then activated to eject a liquid droplet out of the nozzle.

Claim 10:

A method according to claim 9 wherein the width of the hole is between 8 microns and 24 microns.

Rejection:

Recitation of this claim is the same as that in claim 2 and is rejected on the basis as set forth for claim 2 discussed above.

Claim 11:

A method according to claim 9 wherein the width of the supply passage is between10 microns and 28 microns.

Rejection:

Recitation of this claim is the same as that in claim 3 and is rejected on the basis as set forth for claim 3 discussed above.

Claim 12:

A method according to claim 9 wherein the droplet ejection actuators are thermal bend actuators.

Rejection:

Recitation of this claim is the same as that in claim 4 and is rejected on the basis as set forth for claim 4 discussed above.

Claim 13:

A method according to claim 9 wherein the droplet ejection actuators are gas bubble generating heater elements.

Rejection:

Recitation of this claim is the same as that in claim 5 and is rejected on the basis as set forth for claim 5 discussed above.

Claim 14:

A method according to claim 12 further including a plurality of nozzle chambers, each nozzle chamber corresponding to a respective nozzle; wherein, at least one of the gas bubble generating heater elements are disposed in each of the nozzle chambers respectively such that, a bubble forming liquid can be supplied to the nozzle chamber for thermal contact with at least one of the bubble generating heater

elements so that a bubble of the bubble forming liquid generated by one of the heater elements causes a droplet of the ejectable liquid to be ejected from the nozzle.

Rejection:

Recitations of this claim are the same as those in claim 6 and is rejected on the basis as set forth for claim 6 discussed above.

Claim 15:

A method according to claim13 wherein the bubble forming liquid is the same as the ejected liquid.

Rejection:

Recitation of this claim is the same as that in claim 7 and is rejected on the basis as set forth for claim 7 discussed above.

Claim 16:

A method according to claim 9 wherein the printhead is a pagewidth printhead.

Rejection:

Recitation of this claim is the same as that in claim 8 and is rejected on the basis as set forth for claim 8 discussed above.

Claim 25:

A printer system including an inkjet printhead comprising:

a plurality of nozzles;

a plurality of liquid passages leading to each nozzle respectively for providing ejectable liquid to the associated nozzle;

droplet ejection actuators and associated drive circuitry corresponding to each nozzle respectively, the nozzles, ejection actuators, associated drive circuitry and liquid passage being formed on and through a monolithic wafer using lithographically masked etching techniques; wherein,

the monolithic wafer has a droplet ejection side and a liquid supply side; such that, each of the liquid passages is formed by ion etching a hole partially through the monolithic wafer from the droplet ejection side, and etching a passage from the liquid supply side of the monolithic wafer to the hole; wherein, the width of the supply passage exceeds the width of the hole by an amount that will ensure that a fluid connection is established with the hole, having regard to the tolerances of the etching process.

Rejection:

Recitations of this claim are the same as those in claim 1 and is rejected on the basis as set forth for claim1 discussed above.

Claims 26-32:

Recitations of each of these claims are the same as those in claims 2-8 respectively, and are rejected on the basis as set forth for claims 2-8 discussed above.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Response to Arguments

5. Applicant's arguments filed Jan. 18, 2007 have been fully considered but they are not persuasive.

Applicant argued that: the nozzles and chambers are not supported on a monolithic wafer that is ion-etched from both sides. Examiner respectfully disagrees. Because Usui et al. print head including portions 1, 6, and 12 are ceramic (see col. 4, lines 23-24), and ceramic is a monolithic wafer material (see e.g., US 6,582,062, col. 4, lines 44-47).

As to "ion-etched from both sides" in Applicant's argument, please be advised that "Apparatus claims must be structurally distinguishable from the prior art", refer to MPEP 2114. Since Usui et al.'s invention structurally reads on the current application, specially independent claims 1, 9 and 25, the way of etched from both sides as claimed

in these independent claims do not carry patentable weight. Although claim 9 is a method claim, however, the method of this claim deals with steps of ejecting drops, not the way as to how the nozzles and liquid passages are fabricated in a step by step method.

Applicant further argued that: Furthermore, there is no recognition of the nozzle density benefits of etching through a wafer. Please be advised that the features in the specification to which Applicant refers are not recited in the rejected claims (such as claims 1, 9 and 25). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims, please see In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (FED. Cir. 1993).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to shih-wen hsieh whose telephone number is 571-272-2256. The examiner can normally be reached on 9/5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on 571-272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SHIH-WEN HSIEH
PRIMARY EXAMINER

SWH
Feb. 21, 2007